

246656



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**

DEPT. OF TRANSPORTATION

03 JUN 24 PM 2:34

# Memorandum

Subject: Docket Submittal: Docket NHTSA-02-11707-  
Child Restraint Systems 03-15351-2  
Date: MAY 28 2003

From: Mike Huntley, Safety Standards Engineer  
Structures and Special Systems Division  
Reply to  
Attn. of:

To: Docket Section

THRU: George E. Mouchahoir, Ph.D., Chief  
Structures and Special Systems Division

Roger A. Saul, Ph.D., Director  
Office of Crashworthiness Standards

Jacqueline S. Glassman, Chief Counsel

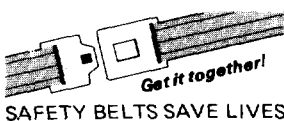
*For Signature for Roger A. Saul*

*for J. S. Glassman*

On November 1, 2000, the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act was enacted, which directs the National Highway Traffic Safety Administration (NHTSA) to initiate a rulemaking proceeding for the purpose of improving the safety of child restraints.

NHTSA published a Notice of Proposed Rulemaking (NPRM) on May 1, 2002 (67 FR 21806) that proposed a number of revisions to Federal Motor Vehicle Safety Standard No. 213, "Child restraint systems," including proposals for (1) incorporating improved test dummies and updated procedures used to test child restraints, (2) adopting new or revised injury criteria to assess the dynamic performance of child restraints, and (3) extending the standard to apply it to child restraints recommended for use by children weighing up to 65 pounds.

In support of these proposed changes, NHTSA performed a series of dynamic tests at the Naval Air Warfare Center (NAVAIR), Aircraft Division located in Patuxent River, MD and at the Vehicle Research and Test Center in East Liberty, Ohio. Additionally, in its comments to the NPRM, the Juvenile Products Manufacturers Association (JPMA) stated that it had conducted a series of 80 sled tests to evaluate (1) how the proposed dummies performed compared to the dummies currently in use, (2) the proposed changes to the standard bench seat, and (3) the proposed injury criteria (reference docket NHTSA-02-11707-40 and NHTSA-02-11707-47).







In an effort to facilitate comparison of the NHTSA and JPMA test results, NHTSA developed a series of charts comparing the pass/fail performance of these tests using both the existing FMVSS No. 213 injury criteria and the injury criteria proposed in the May 1 NPRM where applicable. The charts depict the results in three categories – (1) performance within the injury threshold, (2) performance within the injury threshold, but at a level above 80 percent of the threshold, and (3) performance that exceeded the injury threshold.










Please transmit the attached document, “Comparison of PAX/VRTC and JPMA Sled Tests,” to the subject docket.

## Comparison of PAX/VRTC and JPMA Sled Tests

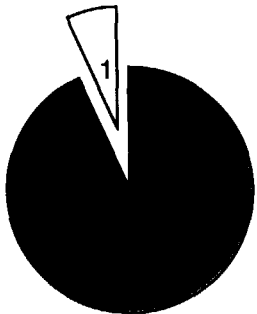
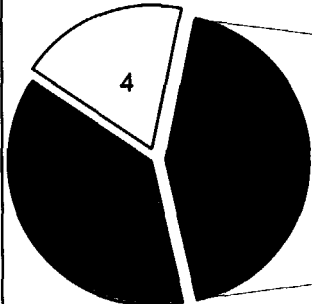
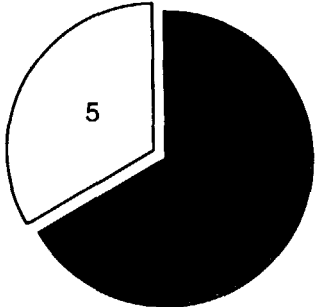
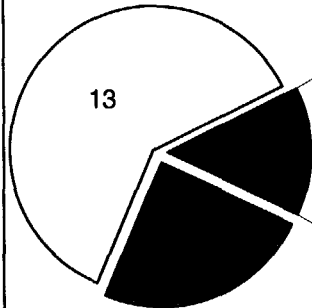
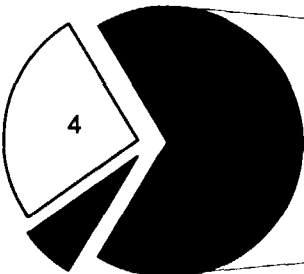
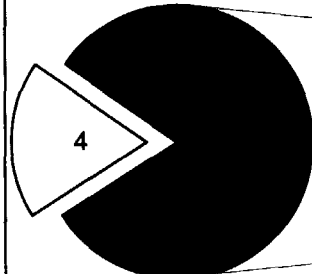
The charts that follow summarize the performance of testing performed by both the National Highway Traffic Safety Administration (NHTSA) and the Juvenile Products Manufacturers Association (JPMA) in support of the Notice of Proposed Rulemaking (NPRM) published on May 1, 2002 in response to the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act.

The test results are presented for each of three dummies, the CRABI 12-month-old and the Hybrid III 3- and 6-year-olds, and for both the existing FMVSS No. 213 injury criteria thresholds and the scaled injury criteria thresholds proposed in the NPRM. Results are provided for Head Injury Criterion (HIC), chest acceleration, and neck injury criterion (Nij). Further, the test results are presented in three categories – (1) performance within the established or proposed injury threshold as shown in green, (2) performance within the injury threshold, but at a level above 80 percent of the threshold as shown in yellow, and (3) performance that exceeds the injury threshold as shown in red. The following charts illustrate the above.

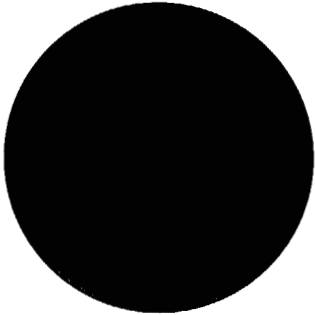
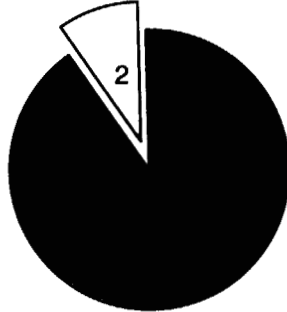
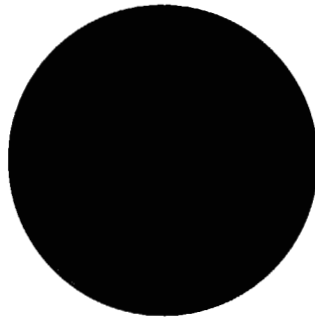
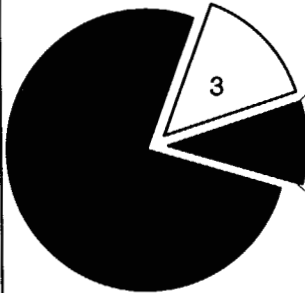
<u>Existing</u> FMVSS No. 213 Injury Criteria	Dummy CRABI 12-month, Hybrid III 3- and 6-year-olds
<b>HIC<sub>∞</sub></b> Existing Limit - 1000 80% Compliance Margin - 800	 $800 \leq \text{HIC} < 1000$ 
<b>Chest Acceleration</b> Existing Limit – 60 g's 80% Compliance Margin – 48 g's	 $48 \text{ g's} \leq \text{chest acceleration} < 60 \text{ g's}$ 
<b>Nij</b> Existing Limit	N/A

<u>Proposed</u> FMVSS No. 213 Injury Criteria	CRABI 12-month	Hybrid III 3-year-old	Hybrid III 6-year-old
<b>HIC</b> Proposed Limit 80% Compliance Margin	 $312 \leq \text{HIC} < 389$  $456 \leq \text{HIC} < 570$  $560 \leq \text{HIC} < 700$		
<b>Chest Acceleration</b> Proposed Limit 80% Compliance Margin	 $40 \leq \text{chest} < 50$  $44 \leq \text{chest} < 55$  $48 \leq \text{chest} < 60$		
<b>Nij</b> Proposed Limit 80% Compliance Margin	 $0.8 \leq \text{Nij} < 1.0$  $0.8 \leq \text{Nij} < 1.0$  $0.8 \leq \text{Nij} < 1.0$		

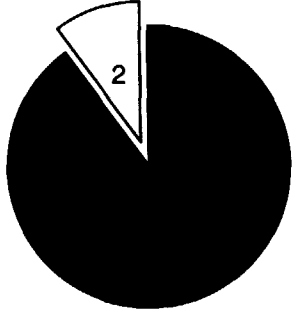
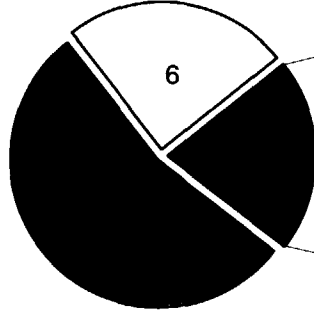
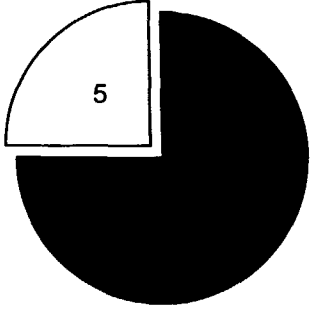
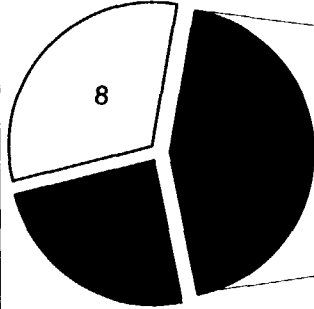
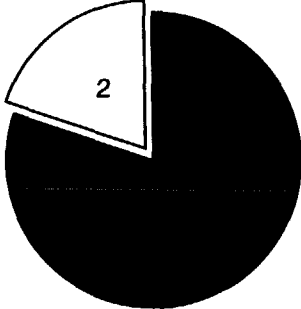
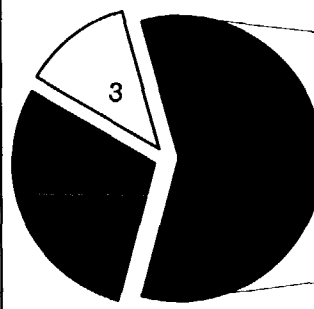
## CRABI 12-Month-Old Dummy Proposed Injury Criteria

	NHTSA – 15 tests	JPMA – 21 tests
<b>Head Injury</b>		 <div> <p><b>RF Infant Only:</b></p> <ul style="list-style-type: none"> <li>3-pt harness w/base (4)</li> </ul> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>5-pt harness; lap belt w/tether (1)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>Overhead shield (3)</li> <li>5-pt harness (1)</li> </ul> </div>
<b>Chest Injury</b>		 <div> <p><b>RF Infant Only:</b></p> <ul style="list-style-type: none"> <li>3-pt harness w/base (1)</li> </ul> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>5-pt harness; lap belt w/tether (1)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>Overhead shield (1)</li> </ul> </div>
<b>Neck Injury</b>	 <div> <p><b>RF Infant Only:</b></p> <ul style="list-style-type: none"> <li>5-pt harness; lap belt only (1)</li> <li>5-pt harness; lap/shoulder belt (2)</li> </ul> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>5-pt harness; lap belt only (1)</li> <li>5-pt harness; lap/shoulder belt (2)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>5-pt harness; lap belt only (1)</li> <li>5-pt harness; lap/shoulder belt (1)</li> <li>5-pt harness; LATCH (2)</li> </ul> </div>	 <div> <p><b>RF Infant Only:</b></p> <ul style="list-style-type: none"> <li>3-pt harness w/base (4)</li> <li>3-pt harness w/out base (1)</li> </ul> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>Overhead shield (1)</li> <li>5-pt harness; lap belt w/tether (1)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>Overhead shield (3)</li> <li>5-pt harness (3)</li> <li>Overhead shield; LATCH (2)</li> <li>5-pt harness; LATCH (2)</li> </ul> </div>

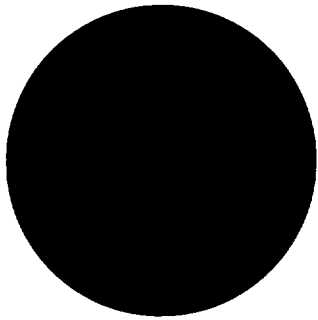
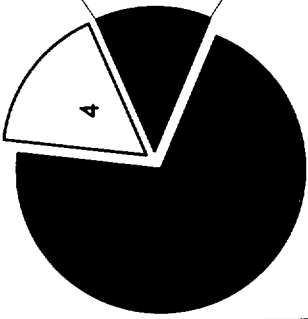
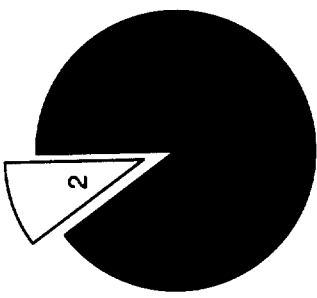
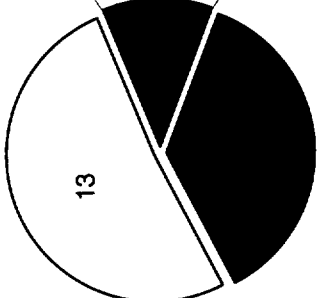
## CRABI 12-Month-Old Dummy Existing Injury Criteria

	NHTSA – 15 tests	JPMA – 21 tests
Head Injury		
Chest Injury		 <div data-bbox="1521 751 1883 1015" style="border: 1px solid black; padding: 5px; margin-left: 10px;"> <p><b>RF Infant Only:</b></p> <ul style="list-style-type: none"> <li>• 3-pt harness w/base (1)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead shield (1)</li> </ul> </div>
<p>Note: The current 9-month-old TNO dummy is uninstrumented, and as such, the agency cannot measure HIC or chest acceleration in tests using this dummy. The data presented here assumes 1000 HIC and 60g chest acceleration thresholds for the 12-month-old CRABI, similar to that currently used for the existing Hybrid II 3- and 6-year-old dummies.</p>		

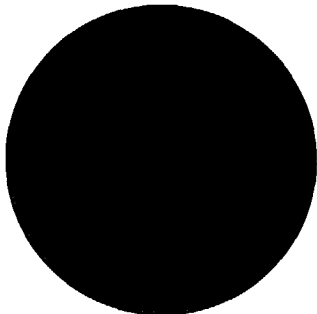
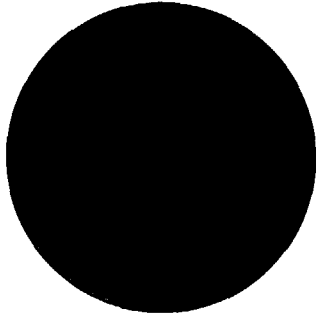
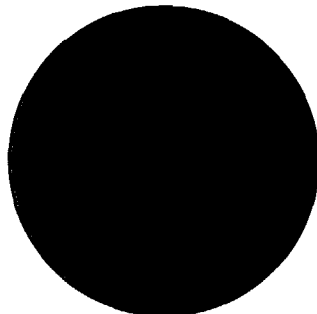
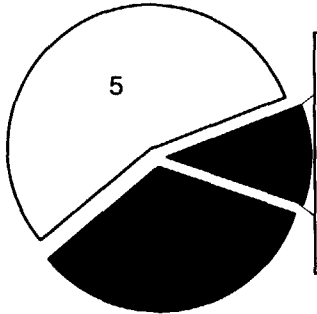
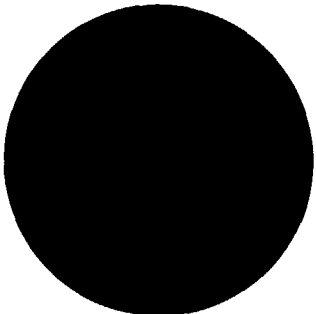
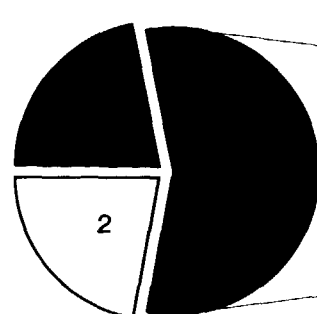
## Hybrid III 3-Year-Old Dummy Proposed Injury Criteria

	NHTSA – 20 tests (10 for Nij)	JPMA – 24 tests
Head Injury		 <div data-bbox="1470 343 1923 588"> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead shield (2)</li> <li>• 5-pt harness; lap belt w/tether (2)</li> </ul> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• High back; lap/shoulder belt (1)</li> </ul> </div>
Chest Injury		 <div data-bbox="1470 707 1953 1047"> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead Shield (1)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead shield (3)</li> <li>• 5-pt harness (2)</li> </ul> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (3)</li> <li>• High back; lap/shoulder belt (2)</li> </ul> </div>
Neck Injury		 <div data-bbox="1470 1120 1953 1504"> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead Shield (2)</li> <li>• 5-pt harness; lap belt w/tether (3)</li> </ul> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>• 5-pt harness (1)</li> </ul> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (3)</li> <li>• High back; lap/shoulder belt (2)</li> <li>• Shield; lap only belt (3)</li> </ul> </div>

# Hybrid III 3-Year-Old Dummy Existing Injury Criteria

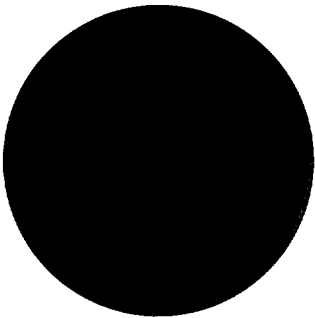
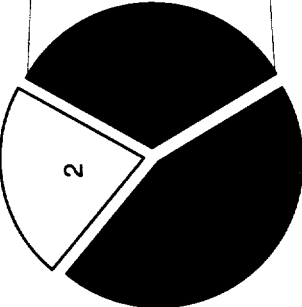
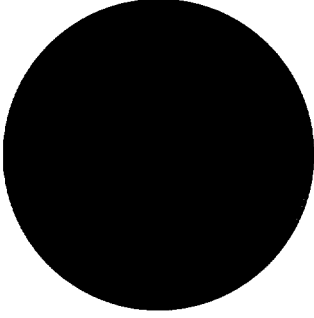
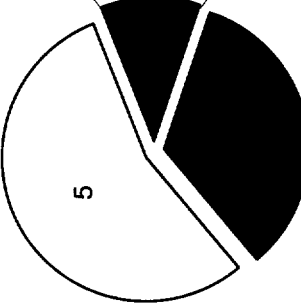
	NHTSA – 20 tests	JPMA – 24 tests
Head Injury		 <div> <p><b>RF Convertible:</b></p> <ul style="list-style-type: none"> <li>• 5-pt harness; lap belt w/tether (1)</li> </ul> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (2)</li> </ul> </div>
Chest Injury		 <div> <p><b>FF Convertible:</b></p> <ul style="list-style-type: none"> <li>• Overhead Shield (2)</li> </ul> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (1)</li> </ul> </div>

## Hybrid III 6-Year-Old Dummy Proposed Injury Criteria

	NHTSA – 8 tests (4 for Nij)	JPMA – 24 tests (Boosters tested with weighted 6-year-old)
Head Injury		
Chest Injury		 <div data-bbox="1517 756 1947 999"> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (1)</li> </ul> </div>
Neck Injury	 <div data-bbox="632 1194 1064 1389"> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (2)</li> <li>• High back; lap/shoulder belt (2)</li> </ul> </div>	 <div data-bbox="1517 1194 1974 1433"> <p><b>Boosters:</b></p> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (2)</li> <li>• High back; lap/shoulder belt (3)</li> </ul> </div>



# Hybrid III 6-Year-Old Dummy Existing Injury Criteria

	NHTSA – 8 tests	JPMA – 24 tests (Boosters tested with weighted 6-year-old)
Head Injury		 <div> <b>Boosters:</b> <ul style="list-style-type: none"> <li>• High back; lap/shoulder belt (3)</li> </ul> </div>
Chest Injury		 <div> <b>Boosters:</b> <ul style="list-style-type: none"> <li>• Backless; lap/shoulder belt (1)</li> </ul> </div>